

## **CPT on Ocean Mixing Process under Sea Ice**

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Resolving the high spatial variability in ice-ocean brine/freshwater exchange has important implications for ocean mixing and consequent sea ice mass budgets that influence critical climate feedbacks. The CPT (IARC, NCAR and GFDL) have worked collaboratively through email, teleconferences, regular meetings and specific visits over the last course of the project. The main goals of the project are:

- 1) Identifying the model errors related to the ocean mixing process under sea ice using observations and idealized model experiments;
- 2) Finding optimum solutions including various parameterization schemes and implementing multi-column ocean grid (MCOG);
- 3) Validating the new model with observations, and conduct model inter-comparison with other Intergovernmental Panel on Climate Change (IPCC) climate models; and
- 4) Soliciting more climate model users to participate in using and assessing the new method through workshops, web-based communications, and distribution of the new model code.

Work has been done on the first two tasks in idealized model runs and forcing runs of the ice-ocean components of CESM. Currently, we know both parameterization and MCOG schemes can improve model results (e.g., vertical salinity profiles and upper mixed layer depth etc.). The added computation cost is about 30% for MCOG and very little for parameterization scheme. But the MCOG is more physically based than the empirical parameterization scheme.

We are moving forward to:

- Publish papers on the results.
- Reorganize/ standardize model code implementation in CESM for broad community users. Besides the 3-D fully coupled code, we will also develop a vertical 1-D CESM for testing as many CESM user demanded.
- Conduct fully coupled CESM runs.
- Have the schemes tested and compared with GFDL model.